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REMARKS

This is in response to the Office Action of May 11, 2000. In view of the foregoing amendments and following representations, reconsideration is respectfully requested.

Initially, an information disclosure statement is being filed concurrently herewith in order to cite Japanese non-examined Patent Publication No. 63-178596 (translation enclosed). Although the cited reference discloses a plurality of nozzles, it fails to disclose or suggest, a nozzle that is movable to a position where the components are successively mounted on a board.

\* \* \* \* \*

Next, on page 2 of the Office Action, claims 8-15 and 18-19 are rejected under 35 U.S.C. 112, second paragraph. In the rejection, the Examiner indicates that the "general" scope of the claims is not clear.

This rejection is respectfully traversed because the preamble of the independent claims recites "A component mounting apparatus", and the body of the claims sets forth a number of interrelated structural elements. Accordingly, there can be no question that the claims are directed to the apparatus.

Further, it would appear that the Examiner's confusion is due to the presence of the functional language in the claims. However,

there is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper. In re Swinehart, 169 USPQ 226 (Fed. Cir. 1971). A functional limitation is often used in association with an element in order to define a particular capability or purpose that is served by the recited element.

The inquiry to be made in determining whether a claim is definite under 35 U.S.C. 112, second paragraph, is whether those of ordinary skill in the art would understand what is being claimed. Amgen Inc. v. Chugai Pharmaceutical, Ltd., 18 USPQ2d 1016, 1030 (Fed. Cir. 1991). It is submitted that one of ordinary skill in the art would understand what is being claimed in the present claims, particularly in view of the fact that the claims are to be read in light of the specification. Should the Examiner have any further questions regarding the scope of the present claims, then the Examiner is requested to contact Applicant's undersigned representative in order to resolve such matters.

\* \* \* \* \*

Next, on pages 3-5 of the Office Action, the claims are rejected over the prior art as follows:

Claims 8-11 and 18-19 are rejected over Dornes (U.S. Patent No. 4,573,262) in view of Japanese Reference No. 3-30499 (hereinafter JP '499);

Claims 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dornes in view of JP '499 and further in view of Oyama (U.S. Patent No. 5,115,559).

It is submitted that the present invention, as defined in the claims, clearly patentably distinguishes over Dornes, JP '499, and Oyama for the following reasons.

Independent claims 8 and 24 each requires that each of the first and second mounting heads has a plurality of component suction nozzles for successively picking up components by suction at one of the component supply tables. The mounting heads can then move, with the sucked components, to a board that is positioned at a board mounting position. After the mounting head has moved to the board mounting position, the mounting head is capable of successively mounting the sucked components on the board while moving in directions which are perpendicular to each other.

Thus, each of independent claims 8 and 24 requires first and second heads having the capability of picking up a plurality of components, and then moving to a different location to successively mount the sucked components. Furthermore, independent claim 18 requires first and second heads, with at least one having a plurality of component suction nozzles for successively picking up components by suction at one of the component supply tables.

Dornes discloses heads 38 and 40, each of which is initially placed in a pick-up position where the head 38 or 40 picks up a single connector 56 (component). Then, the head 38 or 40 is moved to a predetermined position over the circuit board 8, where the pins 57 of the connector 56 are inserted into holes 58 of the board 8 (see col. 3, line 65 to col. 4, line 29). Furthermore, col. 4, lines 41-46 of Dornes states that:

"The connector insertion and pick-up tool 50 has at its working end 68, slots 70, defining legs 72 and the outer ones of which frictionally engage respective side walls 59A, of the housing 59 so that the tool can pick-up the connector 56 from its pick-up station, as the tool is raised."

In other words, Dornes discloses that the operation of picking up a single component 56 is achieved by frictional engagement of respective sides walls 59A of the housing 59 with the slots 70 and the legs 72 of the tool 50, as shown in Fig. 1A, without sucking the component, then the tool moves to a predetermined position over the circuit board 8, and then the pins 57 of the connector 56 are inserted into holes 58 of the board. Thus, a single component picking up step and a single insertion step are repeated sequentially. That is, Dornes merely teaches that an operation consisting of picking-up, moving, and mounting a single component is repeated successively. Therefore, it is clear that Dornes does not disclose or suggest an apparatus that is capable of successively sucking a plurality of the components with a plurality

of component suction nozzles to successively pick-up the components at one of the component supply tables, thereafter moving the component suction nozzles to a board positioned at the board mounting position, and thereafter successively mounting the picked-up components on the board.

Furthermore, Dornes fails to disclose or suggest a component suction nozzle for sucking a component. That is, since a single component 56 is picked up with the frictional engagement of respective side walls 59A of the housing 59 with the slots 70 and the legs 72 of the connector insertion and pick-up tool 50, the connector insertion and pick-up tool 50 cannot pick up different kinds of connectors because a different kind of connector will have different housing side walls 59A, which cannot be frictionally engaged with the slots 70 and the legs 72 of the **same** connector insertion and pick-up tool 50. However, in the present invention, the component suction nozzle can suck different components even though the component may be of a different size and thickness. Such a technique is clearly not possible with the Dornes apparatus.

Furthermore, it is submitted that the Examiner has not properly construed the term "successively". That is, it appears that the Examiner considers that the meaning of "successively picking up the components ... and thereafter successively mounting the picked-up components on the board" can be read on "picking up a single component ... and thereafter successively mounting the

picked-up component on the board". However, there are clear differences between these two descriptions. In particular, in the Dornes apparatus, only a single component is picked up and then mounted on the board. Therefore, Dornes, fails to disclose an apparatus that is capable of sucking a plurality of components, and then mounting the picked-up components. Specifically, in Dornes, when two components are to be picked-up and mounted on a board, a first component is picked up and then mounted on a board, and then a second component is picked up and mounted on the board. In contrast, in the present invention, the apparatus is capable of "successively" picking-up first and second components by suction (that is, all of components to be mounted are sucked), and then successively mounting the first and second components on a board. Note that the dictionary definition of successive is "*following in uninterrupted order; consecutive*". Accordingly, the term "successively" precludes an arrangement which mounts two components by picking up and mounting the first component prior to picking up the second component.

Also, please note that in Dornes, since the respective side walls 59A of the housing 59 of the connector are frictionally engaged with the slots 70 and the legs 72 of the connector insertion and pick-up tool 50 to pick up a single component 56, when a different kind of connector having a housing with different side walls is picked up by the head, the connector insertion and

pick-up tool 50 of the head must be replaced with another connector insertion and pick-up tool having different slots and legs. Therefore, different kinds of components cannot be successively picked up with the Dornes pick-up tool.

JP '499 is cited by the Examiner to teach first and second mounting heads that are movable in perpendicular directions. However, JP '499 merely discloses that the transfer head 10 has a nozzle 17, and that a chip P is picked up by the nozzle 17 by suction and mounted on a board 3. That is, JP '499 discloses that after a single component is sucked, the sucked single component is mounted on the board, and that the operation of sucking a single component and mounting the single component on a board is repeated. Clearly, JP 3-30499 fails to teach or suggest an apparatus capable of picking up plural components successively by suction by a plurality of nozzles, and then successively mounting the plural picked-up components on the board.

In view of the above, it is submitted that the collective teachings of Dornes and JP 3-30499 fail to disclose or suggest a component mounting apparatus having a plurality of nozzles for successively sucking plural components and **thereafter** successively mounting the plural picked-up components on a board.



Further, in Dornes and JP '499, the number of movement paths between the suction positions and the mounting positions is three (3), that is:

(1st component's suction position -> 1st component's mounting position);  
(1st component's mounting position -> 2nd component's suction position); and  
(2nd component's suction position -> 2nd component's mounting position).

In contrast, in the present invention, the number of the movement path between the suction position and the mounting position is one (1), that is:

(1st and 2nd component's suction position -> 1st and 2nd component's mounting position).

Accordingly, the apparatus of the present invention, as defined in independent claims 8, 18 and 24, results in a reduction in the number of the movement paths and the necessary time for moving the head, i.e. the time required to carry out the sucking and mounting operations. In particular, in either of Dornes or JP '499, the suction operation and the mounting operation are repeated for each component, whereas in the present invention, the suction operation is carried out for each of the plural components, and thereafter the mounting operation is carried out for each of the plural components, resulting in a reduction in the time for sucking and mounting because the same operations are successively performed. Therefore, the combined Dornes/JP '499 apparatus is

significantly different from the present invention in both construction and operation.

Oyama is cited by the Examiner to teach "a plurality of nozzles mounted on a mounting head for picking up components one at a time." Oyama, however, merely teaches a carrier turntable 1 having mounting heads 4, each of which has a nozzle 4a moving along a fixed movement circle. Further, a supply unit 22 has a plurality of cassettes 221 and slides laterally. The X-axis and Y-axis tables 3 are composed of an X-axis table 31 and a Y-axis table 32, and a printed circuit board 6 is placed thereon and moved along the X-axis and the Y-axis. In other words, Oyama discloses that each head 4 has only a single nozzle 4a, and thus Oyama fails to disclose or suggest a mounting head having a plurality of nozzles, and that the nozzles are capable of successively sucking a plurality of components and thereafter mounting them on a board.

Therefore, Oyama in combination with Dornes and JP 3-30499, fails to disclose or suggest an apparatus including a component mounting head having a plurality of nozzles for successively picking up a plurality of components by suction and **thereafter** successively mounting the picked-up components on a board. As previously described, with the apparatus defined in claims 8, 18 and 24, the suction operation is carried out for each of the plural components, and thereafter the mounting operation is carried out

for each of the plural components, resulting in a significant reduction in the time required for sucking and mounting the components because the same operations are successively performed.

\* \* \* \* \*

Finally, it is noted that claim 18 is rejected over the Dornes and JP '499 in the previous Office Action. However, claim 18 expressly requires a component mounting head section having a plurality of component suction nozzles. As demonstrated above, neither of the Dornes or JP '499 references discloses or suggests this claimed feature. Note that this fact is acknowledged by the Examiner in the rejection of claim 12, which states that:

Dornes and JP 403030499 fails to show the first and second mounting heads having a plurality of suction nozzles for sucking the components on [sic "one"] at a time components at one time."

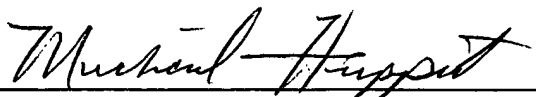
Accordingly, should the Examiner decide to reject claim 18, such rejection must be presented in a "non-final" Office Action.

In view of the above, it is submitted that claims 8-15 and 18-26 are clearly allowable over the prior art of record. The Examiner is therefore requested to pass this case to issue.

In the event that the Examiner has any comments or suggestions of a nature necessary to place this case in condition for allowance, then the Examiner is requested to contact Applicant's undersigned attorney by telephone to promptly resolve any remaining matters.

Respectfully submitted,

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